Stability of Monetary Unions

Fidrmuc, J.; Horváth, J.

Publication date:
1998

Stability of Monetary Unions: Lessons from the Break-up of Czechoslovakia[†]

Jan Fidrmuc[*]
Július Horváth[**]

June 1998

Abstract

In 1993, Czechoslovakia experienced a two-fold break-up: On January 1st, the country disintegrated as a political union, while preserving an economic and monetary union. Then, the Czech-Slovak monetary union collapsed on February 8th. We analyze the economic background of the two break-ups, and discuss lessons for stability of monetary unions in general. We argue that while Czechoslovakia could be considered an optimum currency area, it was in fact less integrated than some other existing unions. That, along with low labor mobility and higher concentration of heavy and military industries in Slovakia, made Czechoslovak economy vulnerable to asymmetric economic shocks – such as those induced by the economic transition. Furthermore, the Czech-Slovak monetary union was marred by low credibility, lack of political commitment, low exit costs, and the absence of fiscal transfers.

Keywords: Optimum currency areas, Disintegration, Czechoslovakia
JEL classification: F33, F36, F42

[†] We are grateful to Thomas J. Courchene, Richard Grabowski, Jürgen von Hagen, Marco Hoeberichts, Gérard Roland, and Harald Uhlig for helpful comments and suggestions. Jan Fidrmuc acknowledges support from the European Union's Phare ACE Program 1996, and the Netherlands Organization for Scientific Research.

[*] Corresponding author: CentER for Economic Research, Tilburg University, and ECARE, Université Libre de Bruxelles. Address: CentER, P. O. Box 90153, 5000 LE Tilburg, The Netherlands. Email: J.Fidrmuc@KUB.NL, Phone: +31-13-466-2678, Fax: +31-13-466-3066.

[**] Zentrum für Europäische Integrationsforschung (ZEI), University of Bonn, and Central European University, Budapest. Address: Walter-Flex-Strasse 3, 51113 Bonn, Germany. Phone: +49-228-73-1892; Fax: +49-228-73-1809; E-mail: Horvath@united.econ.uni-bonn.de.

1 Introduction

In 1993, Czechoslovakia experienced two-fold break-up: On January 1st, the country disintegrated as a political union of the Czech and Slovak Republics, while preserving an economic and monetary union. Then, the Czech-Slovak monetary union collapsed on February 8th. [1]

In the paper at hand, we analyze the two Czechoslovak break-ups and attempt to draw implications for stability of monetary unions. Our main aim is not to explain the failure of Czechoslovakia as a political union. We believe this can be (and has been) better answered by political scientists. Rather, we focus at the economic reasons underlying the collapse of the Czech-Slovak monetary union (CSMU).

The demise of Czechoslovakia is most often explained by the political deadlock following the 1992 general election.[2] Sociologists point out to social and demographic differences between the two nations. However, as Musil (1995) suggests, "the two societies, at the time of the split, had substantially more in common than they had at the time of Czechoslovakia's formation." According to Musil, Czechoslovakia broke up because of failure to establish single Czechoslovakian identity. Dedek et al. (1996) describe the economic background of Czechoslovakia's disintegration. They, similarly, point out that the two economies converged, at least after the WWII, rather then diverged. However, although Dedek et al. set out to analyze the economic aspects of the break-up, they also subscribe to the idea of political motivation for the disintegration. Capek and Sazama (1993) and Pavlinek (1995) suggest that differences in attitudes toward economic reforms contributed to the break-up. Accordingly, Czechs associated socialism with stagnation and/or deterioration of their standard of living. On the other hand, Slovaks saw socialism as a period of rapid growth and catching up with the richer Czech Lands. As a result, they argue, there was much stronger resistance toward economic reforms in Slovakia than in the Czech Republic.[3]

The economic background of the break-up of Czechoslovakia and subsequently the Czech-Slovak monetary union has not been analyzed in the literature much. Nevertheless, we believe there are important lessons to be learned from the break-up of Czechoslovakia and the collapse of Czech-Slovak monetary union, in particular in the context of analyzing stability of other monetary arrangements such as the EMU.

Recent rise of incidence of disintegration, particularly in the former communist countries, as well as rising nationalism in Western countries such as Belgium, Spain, Italy or Canada, substantially increased academic interest in this topic. Bolton and Roland (1997) explain break-ups of nations by political conflict over redistribution

[1] After the break-up of Czechoslovakia the two successor republics agreed to retain close ties, in particular monetary and customs unions. While the customs union proved to be a viable arrangement, the monetary union lasted only until the second week in February. The use of the Czechoslovak currency was discontinued even though both republics originally pledged to retain the *koruna* for *at least* a six-month period.

[2] See for example, Batt (1993), Wolchik (1995) and Stranger (1996). However, Fidrmuc (1998a) shows that the results of the 1992 election reflected the differences in the underlying economic factors such as unemployment, extent of entrepreneurial activity, and average wages. The political deadlock after the elections thus stemmed from different support for reforms in the two countries – while Czech voters reelected pro-reform parties, Slovak voters put the left-wing nationalists to the office.

[3] While this explanation for differences in support for reforms is quite plausible, Fidrmuc (1998) shows that electoral support for pro-reform parties is related to costs and benefits of reforms. In particular, reforms yielded higher unemployment and less entrepreneurial activity in Slovakia, and thus were less popular.

policies. Regions trade off efficiency gains from integration and the cost of not having redistribution policy preferred by the median voter. When income inequality differs across regions and the efficiency gains from integration are small, unions break up. Alesina and Spolaore (1997) present a model with endogenous formation of nations. Integration yields economies of scale but comes at the cost of increased heterogeneity of unions. They show that democratization and economic integration lead to higher number of nations. The latter result is further pursued by Alesina, Spolaore and Wacziarg (1997). They present a model where trade liberalization increases incentives for regions to secede. This conclusion is then supported by their empirical analysis. Alesina and Perotti (1995) focus on the benefits of risk sharing but point out that it may come at the price of increased political risk. In other words, integration may reduce uncertainty of the tax base (risk sharing) but increases the volatility of the tax rate (political risk). Finally, Fidrmuc (1998b) explores the incentives for (dis)integration in a setting where countries face stochastic economic shocks. He shows that the stability of unions depends not only on the correlation (or symmetry) of shocks but also on their persistence. In particular, unions are more fragile if shocks are negatively correlated and persistent. On the other hand, temporary negatively correlated shocks increase the potential benefits of integration because of risk sharing.

Another stream of the literature reflects the gathering momentum of the European integration. A large portion of the literature deals with (non)desirability of the EMU. Its arguments mainly rest on the theory of Optimum Currency Areas and/or analysis of costs and benefits of monetary integration. Examples of this stream are De Grauwe (1994), Canzoneri and Rogers (1990) and Uhlig (1996). Another part of the literature is concerned with the institutional setup of the union, in particular with credibility and independence of the European Central Bank, (for example Cukierman (1995), Von Hagen and Suppel (1994) and Von Hagen and Neumann (1996)), and constraints on monetary and fiscal policies in the EMU (Von Hagen and Hammond (1996), Eichengreen and Von Hagen (1996) and Von Hagen and Eichengreen (1996)). Finally, the factors affecting the decisions of individual countries whether to join or stay out also attracted considerable attention (Cukierman (1996), Frankel and Rose (1996), and Melitz (1996)).

Empirical literature on disintegration, however, is very limited. Cohen (1993) looks at the sustainability of monetary unions based on comparative analysis of six historical examples of monetary integration: Belgium-Luxembourg Economic Union, CFA Franc Zone, East Caribbean Currency Area, East African Community, Latin Monetary Union and Scandinavian Monetary Union. He discusses economic, organizational and political factors and identifies the last group as “most instrumental in determining the sustainability of monetary cooperation among sovereign governments.”

In the present paper, we analyze the two-fold Czechoslovak break-up and draw implications for stability of monetary unions. Our aim is to identify what economic factors contributed to the failure of the Czech-Slovak monetary union. If the political disintegration of Czechoslovakia was indeed caused solely by political factors, then there was little rationale for abandoning the common currency. Political objectives of the two nations could have been realized while retaining the monetary union. The fact that common currency did not last for more than five weeks suggests that there may have been deeper economic reasons for the break-up.

We proceed as follows. In Section 2, we analyze economic reasons for the break-up of Czechoslovakia using criteria of the optimum currency area literature. In Section 3 we discuss the break-up of the Czech - Slovak monetary union. In Section 4 we

derive some conclusions for other monetary unions. Finally, in last Section we summarize and conclude.

2 The Break-up of Czechoslovakia and the Optimum Currency Area Theory

Issues discussed in the optimum currency area (OCA) literature were known for a long time, however Mundell (1961) is usually considered as the first seminal contribution to this literature. Mundell stated the problem in its full difficulty as the search for a way how to determine the range of the territory within which one currency should be used. In Mundell's words, it is the search for an "appropriate domain of a currency area." He and the subsequent literature discuss the search for criteria which would "define the optimum currency area, within which the exchange rates should be pegged immutably, but whose rates should fluctuate, or at least be varied, vis-à-vis the outside world" (Kenen, 1969 p. 41). The search for optimum currency areas then involves two types of problems: First, to establish whether an existing currency area, say x, constitutes an optimal currency area, i.e. whether "each separate part of x would be better off with the same currency." (Mélitz, 1995, p.496). Or, second, whether "area x as a whole would be better off in a larger currency area and without a separate currency." (Mélitz, 1995, p.496). In this Section we attempt to give some tentative answer to the first question in Mélitz classification, i.e. using six traditional criteria we attempt to establish whether Czechoslovakia, during the time of its existence, constituted an optimum currency area. Failure to fulfill some of the criteria could have been the reason for the break-up, or, a source of tension preceding the break-up.

Three different types of criteria have been identified by various strands of the optimum currency area literature:

(i) *Traditional optimum currency area criteria:*[4] This is an approach mostly popular in 1960s and the early 1970s, and from the late 1980s there has been a revival of these criteria reflecting the progress in the western European integration. In this literature different criteria were identified as being particularly relevant to the choice of an exchange rate regime. We focus on the following: intensity of mutual trade, diversification of industrial structure, degree of labor mobility between countries and/or regions, fiscal federalism, symmetry and asymmetry of supply and demand shocks, and degree of openness of the economy.[5]

(ii) *Modern criteria for optimum currency area:*[6] This approach is rooted in modern macro-economics starting from late 1970s until today.

(iii) *Political criteria for optimum currency area:* These were emphasized in a rarely quoted work of Mintz (1970) and Machlup (1977) and recently by Goodhart (1995).

In the following, we discuss the importance of the individual criteria for Czechoslovakia.

---

[4] For an early review of these criteria, see Ishiyama (1975).

[5] We do not discuss some criteria, which seem to be relatively difficult to apply to the case of Czechoslovakia. Due to the peculiar characteristic of the socialist economy there was little room for movements in nominal variables. Thus we leave out the discussion of criteria such as the degree of price and wage flexibility, the degree of goods market integration, and similarity of inflation rates.

[6] For a review see Tavlas (1993). For similar reasons as discussed in the above footnote we leave out the discussion of criteria of the 'new' theory of optimum currency areas. These include, for example, the nominal anchor issue, monetary neutrality, time-inconsistency issue.

2.1 Symmetry and Asymmetry of Supply and Demand Shocks

In his classical contribution, Mundell (1961) presents an example of a two-country world in which both countries are exposed to asymmetric demand shocks. In both countries, nominal wages are sticky and labor mobility is low. In the presence of asymmetric shocks, the countries can adjust the exchange rate to alter the relative prices and mitigate adverse effects of the shocks. However, if these two countries use the same currency, country-specific monetary policy measures are no longer possible, and thus adjustment is more costly than in the previous case. This implies that if two regions are exposed to asymmetric shocks, they should use the adjustment potential of the flexible exchange rates.[7] On the other hand, adopting fixed exchange rates or common currency may be optimal in the shocks are symmetric. For the purpose of this paper, this criterion has the following interpretation: If Czech and Slovak Republics were exposed to asymmetric shocks, then this fact would have increased incentives to break up. On the other hand, if the two countries were exposed to symmetric shocks, then the weight of this criterion in understanding the break-up is low.

How to measure the incidence of supply and demand shocks is not a clear matter, since the shocks are not directly observable. Following Bayoumi and Eichengreen (1993), we attempt to address the problem by using the aggregate demand and aggregate supply (AD-AS) model. In this model, both shocks have permanent effect on prices, whereas only supply shocks have permanent effect also on real output.[8]

To evaluate the extent to which the Czech and Slovak Republics were exposed to symmetric shocks, we use bivariate VAR model to decompose the variations in the series into demand (temporary) and supply (permanent) shocks.[9] A detailed description of this approach is delegated to the Appendix. We used real and nominal output proxied by net material product (national income) in constant and current prices covering the period 1960-90. Table 1 presents the results.

The demand and supply shocks affecting the Czech Republic and Slovakia are significantly and positively correlated. That is not surprising, as the two countries were integrated during most of the 20th century. Indeed, one would expect that being part of a single economic and monetary area, and being exposed to the same or similar economic policies, would cause the shocks experienced by the two countries to be highly correlated. Moreover, disposable NNP shows higher correlation than NNP, especially for demand shocks. Since the DNNP also reflects transfers between the two regions, higher correlation for DNNP indicates that fiscal policy mitigated the effects of asymmetric shocks.

---

[7] Melitz (1995) raises the point that Mundell's argument is valid only in two-country world, where giving up one country's currency implies establishing a single world currency. In a more realistic example of three-country world – where two countries can form a currency union and the third country stays outside the union – Mundell's argument is weaker."Thus, to the extent that there are separate required price movements relative to the union partner and the outside world, the members give up less exchange rate adjustment when they form a monetary union." (Melitz, 1995, p.494). While an adjustment to an asymmetric demand shock could be handled easily in a two-country case, in a three-country case "the asymmetric nature of a shock can never tell us enough about the needed correction if a country's choice of a partner in a monetary union is crucial."

[8] See Bayoumi and Eichengreen (1993) for further discussion and illustration.

[9] We adopt the terminology coined by Bayoumi and Eichengreen (1993). As Minford (1993) points out, however, this is somewhat misleading. For example, the temporary shocks, denoted here as demand shocks, may also reflect transitory supply shocks, policy responses to shocks, and exchange rate adjustments. A similar argument holds for the permanent (supply) shocks.

Insert Table 1 here.

To assess the viability of Czechoslovakia as a single currency area, it is instructive to compare it with other existing unions. In particular, Table 1 reports estimates of correlation of supply and demand shocks for three such unions: the EU, Germany, and the US. This comparison shows that the correlation of supply and demand shocks between the Czech and Slovak Republics is comparable to correlations between those EU countries most likely to become first wave members of the EMU. However, the correlations of shocks estimated for the two parts of Czechoslovakia are generally lower than the correlations for the core German Ländern and US regions.[10] Hence, although the shocks that affected the two parts of Czechoslovakia were generally symmetric, the results of our econometric analysis suggest that Czechoslovakia was in fact less integrated than the core regions of Germany or the US, and only comparable with the core members of the EU. Since Czechoslovakia was a union throughout its post-war history, one would expect a higher correlation of shocks.[11]

We thus conclude that relatively low correlation of demand and supply shocks may in fact have given reason for economic tensions between the two republics. The tensions became probably more profound after 1990 in the wake of economic reforms.

2.2 Cointegration and Convergence

Next, following Bernard and Durlauf (1991) we test for the presence of common stochastic trends in per capita output of the Czech and Slovak Republics during the period 1948-1991. Then, we test for stochastic convergence.

We use the notion of common stochastic trends as is usual in the literature on unit roots and cointegration. Thus, if two series contain unit root, they can be cointegrated if the movement in them is determined by a common factor. We test for the presence of unit root using the Augmented Dickey-Fuller test. The results (available from the authors upon request) indicate that we cannot reject the null of unit root both for the real and nominal output per capita in both republics.

Following Bernard and Durlauf (1991, p.5), we define the presence of a common stochastic elements in per capita output by the following relationship:

$$Y_{i,t} = \mu + \gamma Y_{j,t} + \nu_{i,j,t} \qquad (1)$$

where $\nu_{i,j,t} \sim N(0, \sigma^2)$ and is stationary in levels, and $Y_{i,t}$ and $Y_{j,t}$ are integrated of order one.

The estimation of equation (1) yields:

$$Y^R_{CZ,t} = 1.854374 + 0.833577\ Y^R_{SK,t}$$
$$(0.00814)$$
$$Y^N_{CZ,t} = 2.092551 + 0.813388\ Y^N_{SK,t}$$
$$(0.012534)$$

[10] For both Germany as well as the US, we can identify the regions which are closely integrated with most of the other regions (the core) and the regions which are highly specialized (the periphery, for example, Hamburg in Germany and Rocky Mountains in the US). See Funke (1997) and Bayoumi and Eichengreen (1993), respectively.

[11] Frankel and Rose (1996) argue that the OCA criteria are endogenous. Hence, two countries with a history of being part of the same monetary union should show higher correlation of shocks than otherwise.

where Y^R (Y^N) is the log of real (nominal) net material product per capita, with the subscripts *CZ* and *SK* denoting Czech and Slovak data, respectively. Standard deviations are in parentheses.

Next, we tested – using the augmented Dickey-Fuller unit root test with 2-5 lags – for unit root in the residuals yielded by equation (1). We can reject the presence of unit root at 5% significance level for nominal figures (the results are available from the authors upon request). Thus, as we would expect shocks to one country were related in part to those in the other country. On the other hand, the results for real figures are mixed: the null of presence of unit root is rejected for 2 lags but we fail to reject the null for 3-4 lags.

We obtained analogous results when using the Johansen's cointegration test: The test results summarized below indicate the presence of one common stochastic trend for nominal data, and reject cointegration for real data.

Test of cointegration, nominal net material product per capita

Eigenvalue	Likelihood Ratio	5 % critical	coint.vectors	Result
0.3555060	18.02784	15.41	none	reject
0.001105	0.045338	3.76	at most 1	accept

Test of cointegration, real net material national per capita

Eigenvalue	Likelihood Ratio	5 % critical	coint.vectors	Result
0.161235	8.075403	15.41	none	accept
0.025724	1.042438	3.76	at most 1	

Next, we test for stochastic convergence. Following Bernard and Durlauf (1991, p.5) stochastic convergence in per capita output implies the following relationship:

$$Y_{i,t} = Y_{j,t} + \nu_{i,j,t} \qquad (2)$$

where $\nu_{i,j,t} \sim N(0, \sigma^2)$ is an error term, and $Y_{i,t}$ and $Y_{j,t}$ contain stochastic trends. The log of per capita output in country *i* converges to log per capita output in country *j* if the error term $\nu_{i,j,t}$ is stationary in levels.

We tested for stochastic convergence both in nominal data as well as in real data. The estimation of equation (2) yields:

$$Y^N_{CZ,t} = 1.029759\ Y^N_{SK,t}$$
$$(0.002493)$$
$$Y^R_{CZ,t} = 1.030948\ Y^R_{SK,t}$$
$$(0.001930)$$

where the variables have the same meaning as above. The results of the augmented Dickey-Fuller tests for nominal data show that the residuals yielded by estimation clearly contain unit root. Similarly, the augmented Dickey-Fuller tests also indicate the presence of unit root in the disturbance term yielded from the estimation with real data. Thus both tests indicate that Czech and Slovak NNP per capita did not stochastically converge in the sense of Bernard and Durlauf (1991).[12]

We therefore conclude that the nominal per capita net material product series of the two countries reveal cointegration during the period 1948-1991, i.e. they contain common trends. However, common trends are only necessary but not sufficient for the presence of stochastic convergence. And indeed, the data quite clearly reject the

[12] For comparison, Bernard and Durlauf (1991) reject the no convergence null hypothesis at five per cent level for most of the tested countries except a small number of core western European countries.

hypothesis that Czech and Slovak per capita net material products stochastically converged.

2.3 Intensity of Mutual Trade

The benefits of single currency rise with the volume of trade. Therefore, countries that trade with each other extensively will benefit more from monetary integration. For this reason, intensity of mutual trade is one of the main criteria for assessing the benefits and costs of integration (or disintegration). In addition, as Frankel and Rose (1996) argue, high intensity of mutual trade increases the correlation of economic shocks between respective countries. Hence, countries engaging in mutual trade extensively will also generally fulfil the criterion of symmetry of shocks because the latter is in fact endogenous.

The extent of mutual trade between the Czech and Slovak Republics was and has remained relatively high. Due to different sizes of the two republics (the population ratio of the Czech Republic to Slovakia is roughly 2:1), Slovakia has been dependent on the Czech Republic in much greater extend than the Czech Republic on Slovakia.

Figures 1 and 2 document the extent of mutual trade.[13] In 1991, the Czech Republic accounted for some 50 percent of Slovak exports and imports. On the other hand, Slovakia accounted for about a third of Czech trade. After the break-up, the share of Slovak trade with the Czech Republic fell to 31 and 25 percent of total exports and imports, respectively. Czech trade with Slovakia declined to 14 and 10 percent of total exports and imports, respectively. The decline in relative importance of mutual trade (percentages) was more dramatic than the fall in absolute levels, as Figure 3 illustrates[14] (note that the graph depicts figures in national currencies, not adjusted for inflation). Mutual trade fell substantially in 1992 and 1993 but then leveled off after 1994.

This points to an extraordinarily high degree of interdependence between the two countries prior to the split and continuing even after the split and the collapse of the monetary union. Note that Slovakia was the Czech Republic's most important trading partner until the split – accounting for a greater share of trade than Germany. Such pattern of mutual trade is rather untypical for two small open economies. For example, Norway only accounts for 6 percent of Sweden's exports[15] – although these two countries could be compared with the Czech Republic and Slovakia in terms of similarities in culture, language, relative and absolute size, geographical proximity, openness and liberalization of mutual trade. The Czech Republic still accounts for a greater share of Slovak exports than is, for example, Germany's share in Dutch exports (28 percent)[16] – even though the Czech Republic's population is double of that of Slovakia while the ratio between Germany and the Netherlands is 5:1. On the other

[13] The figures reported for 1991-92 are based on data reported by enterprises. Starting with 1993, trade flows were reported based on customs statistics. Hence, 1991-92 figures do not reflect all trade flows, in particular trade carried out by small firms that were exempt from reporting requirements. We are not aware of any earlier estimates of mutual trade, however.

[14] The same caveat regarding data applies here as in the preceding paragraph. Moreover, as Fidrmuc and Fidrmuc (1997, p. 215) argue, Czech and Slovak official data on mutual trade differed substantially since the split – for example, both republics claimed trade surplus both in 1993 and 1994.

[15] Sweden: Financial Times Survey, November 20, 1996.

[16] The Netherlands: Financial Times Survey, October 29, 1996.

hand, the pattern of trade within Czechoslovakia is in line with McCallum's (1995) conclusions about importance of national borders for trade.

Masson and Taylor (1992, p.15) report that the ratio of intra-area trade to total trade was 54 percent (exports) and 51 percent (imports) in case of the 12 EU countries (in early 1980s). The same figure was 37 and 34 percent, respectively, for the US and Canada together. The value of this ratio for former Czechoslovakia stood at 38 percent for exports and 32 percent for imports in 1992. After the split, the ratio declined to 24 percent in 1993 for both exports and imports and 23 and 19 percent, respectively, in 1994. Although the pre-split ratio of mutual trade is lower than the value for the EU, it is comparable to the share of mutual trade between the US and Canada. However, the figure is rather high when taking into account the relatively small size of the region involved. Hence, the extend of mutual trade between the Czech Republic and Slovakia seems sufficiently high to qualify as an optimum currency area – both before and after the split.

2.4 Diversification of Industrial Structure

Kenen (1969) argues that for a well-diversified economy the importance of asymmetric shocks will be much smaller than for a less-diversified economy. "From the standpoint of external balance, taken by itself, economic diversification, reflected in export diversification, serves, ex ante, to forestall the need for frequent changes in the terms of trade and therefore, for frequent changes in national exchange rates." (p. 49). Thus, fixed rates are "most appropriate – or least inappropriate – to well-diversified economies... " Similarly, then the less diversified economies should use flexible rates. In other words, if output and exports of a country are sufficiently diversified, then disproportional shocks affecting certain industries will not have equally profound effect on the economy as a whole. On the other hand, should exports be heavily biased toward certain industries, then shocks affecting these industries will also have significant effect on the overall business cycle of the country. This, in turn, increases the importance of asymmetric shocks within the monetary union.

Structure of output in the Czech Republic and Slovakia does not appear dramatically different from figures reported by Masson and Taylor (1992, p. 21) for selected OECD countries. Manufacturing is the most important category (besides services) accounting for about a quarter of output. Manufacturing also accounts for the greatest part of exports (Table 2): 70 percent of Czech exports and 64 percent of Slovak exports.[17] The commodity structure of foreign trade of the two countries is quite similar. The main difference is that Slovak exports are more biased toward manufactured products with relatively low value-added (SITC 6). On the other hand, machinery and transport equipment (SITC 7) dominate Czech exports. On the import side, SITC 7 is more important for the Czech Republic is while Slovakia has a greater share of mineral fuels (SITC 3). Commodity structure of mutual trade between the two countries is not much different from their overall export patterns.

Insert Table 2 here.

However, while the structure of output appears similar at aggregate level, there were more differences at disaggregate level. In particular, large parts of Slovak industry were build only after the communist takeover in 1948 – within the policy of

[17] SITC categories 6, 7 and 8.

industrialization of Slovakia. Slovak industry was hence much more affected by communist political objectives, in particular emphasis on heavy engineering, metallurgy, and chemical industry.[18] As a result, Slovakia was more dependent on trade with the CMEA[19] countries and thus was affected more adversely by the collapse of CMEA trade. The shares of exports to the CMEA and EU in 1991 were 42 and 34 percent, respectively, compared to 35 and 43 percent for the Czech Republic (Fidrmuc and Fidrmuc, 1997, p. 194).

Slovakia also had greater concentration of military-equipment industry. The latter was particularly important, since the output of this industry in Czechoslovakia shrank to 15 percent between 1987 and 1992. This decline affected Slovakia disproportionately. Whereas Slovakia accounted for 60 percent of Czechoslovak military-equipment production in 1987, its share fell to 40 percent by 1992.[20]

Finally, Slovak industry was also rather strongly regionally concentrated (see Fidrmuc et al. 1994, section 3). Enterprises were on average larger, and often presented the dominant source of regional employment.

Hence, we conclude that the output and foreign-trade structures of Czech Republic and Slovakia seem sufficiently diversified, and exports of both countries show similar commodity structure. However, greater dependence of Slovakia on heavy and military-equipment industries as well as its greater orientation towards former CMEA may have been sources of asymmetric developments, in particular during the economic transition in early 1990s.

2.5 Degree of Inter-regional Labor Mobility

Sufficiently high labor mobility within the union serves to mitigate the effects of asymmetric shocks – since it allows workers from regions hit by high unemployment to take up jobs in other parts of the union. If there was high degree of labor mobility between Czech Lands and Slovakia then both countries could be viewed as suitable candidates for monetary union. While labor mobility was not particularly high in former Czechoslovakia, there were no restrictions on labor flows between the Czech Republic and Slovakia. Moreover, there were little if any cultural, religious or language barriers.

Yet, differences in unemployment rates were substantial and pervasive. In December 1992, average unemployment reached 10.4 percent in Slovakia and 2.6 percent in the Czech Republic. Regional differences in unemployment were even more dramatic, the minimum and maximum regional unemployment rates were 0.32 and 6 percent in the Czech Republic, and 3.8 and 19.3 percent in Slovakia. In fact, there has been a clear pattern of increasing unemployment rates from the West to the East of the former federation – with the exception of major urban areas. This pattern has persisted also after the split.

This pattern of regional distribution of unemployment suggests that the two countries indeed experienced asymmetric economic developments – especially during economic transition. The persistence of regional differences in unemployment suggests

[18] See Pavlinek (1995), p. 358, and Capek and Sazama (1993), p. 214.

[19] Council of Mutual Economic Assistance, or Comecon.

[20] Dedek et al. (1995), p.56 and Kiss (1993), p. 1046. According to Kiss, military industry accounted for 3 percent of Czechoslovak GDP and 10.5 percent of industrial output in 1987.

that labor was not sufficiently mobile to mitigate effects of adverse economic developments.[21]

To assess the efficiency of labor mobility in countering asymmetric regional developments, we regressed net regional migration (inflow less outflow as percentage of total population of the region) on regional unemployment rate, using county data for the Czech Republic and Slovakia. We performed the analysis for 1992 and 1994, to capture possible differences following the break-up. The results are summarized in the top left panel of Table 3. If interregional labor flows respond to unemployment, the regression should reveal a negative relationship. Indeed, the estimated coefficients are negative and significant – with the exception of Slovakia in 1992. However, only 1994 estimates are robust to including other explanatory variables in the regression. Based on this empirical evidence, it thus appears that the relationship between unemployment and internal labor mobility was weak prior to the split. On the other hand, unemployment shows as an important determinant of migration flows within the two countries after the split.

Insert Table 3 here.

A different picture emerges, however, when we consider inter-republic labor flows. The right panel of Table 3 presents the results of regressions on the pooled data set, containing both Czech and Slovak counties. The coefficient of unemployment is negative and strongly significant in 1992 but insignificant in 1994 – both in regressions with and without additional explanatory variables. To test whether the restriction of equality of intercept and slope coefficients can be imposed over both subsamples, we included among the explanatory variables a dummy for Slovakia and an interaction variable (product of the dummy and unemployment rate). These results are reproduced in the second and fourth columns of the right-hand panel. For 1992, the joint hypothesis of zero coefficients for the dummy and the interaction variable is accepted. For 1994, it is rejected at 6% significance level for the regression without additional explanatory variables and 3% level with additional variables.

These results indicate that inter-republic unemployment-induced mobility dominated in 1992, while internal mobility became more important after the split. Labor mobility thus appears to have served to mitigate the effects of asymmetric shocks. However, the size of this effect is in fact very modest, the regression estimates indicate that a one percentage-point increase in unemployment rate induces between 0.02 and 0.03 of the county's population to leave annually.[22] The adjustment process was thus rather slow, and labor mobility was apparently not very efficient as a means for mitigating asymmetric shocks.

2.6 Inter-regional Fiscal Transfers

What was the extent of interregional transfers in response to shocks in former Czechoslovakia? As Sala-i-Martin and Sachs (1992), and von Hagen and Eichengreen

[21] Legaly, labor mobility between the Czech Republic and Slovakia was affected neither by the break-up of the federation nor by the collapse of the monetary union. Prior to the split, the two republics concluded an agreement effectively creating a single labor market and this agreement was independent of the agreements on establishing customs union and monetary union.

[22] In 1992, the average labor mobility was 0.023% (over the pooled data set), with a standard deviation of 0.18. The minimum and maximum were –0.42% and 0.55%, respectively.

(1996) show there is always a pressure on the central government to provide tax-smoothing and automatic stabilization services. Also in Czechoslovakia, throughout its post-war history, there was an important net transfer of funds from the Czech Republic to Slovakia – mainly embodied in redistribution of federal tax revenue. However, the exact size of the transfer has never been reported.[23] The estimates of the size of the transfer in 1992 range from CSK 13.5 billion (Hajek et al., 1993) to CSK 25 billion (OECD, 1994), or 4.4 and 8 percent of Slovak GDP, respectively. Hajek et al. also estimate the net transfer for 1990 and 1991 at CSK 3.8 and 7.7 billion, or 1.5 and 2.6 percent of Slovak GDP, respectively.

Fiscal transfers were an important source of convergence of per capita income within the former federation – according to OECD (1994), the gap fell from 40 percent in 1948 to 13 percent in 1988. Moreover, the transfers also served to counter adverse economic shocks. Indeed, as the figures estimated by Hajek et al. (1993) indicate, the size of the net transfer increased considerably since the start of the transition. This occurred apparently in response to greater costs of reforms incurred by Slovakia. The transfers dried out after the break-up, however. End of the transfers at a time when the economy was close to the bottom of the reform-induced recession created additional pressure on Slovak economy. In the absence of fiscal transfers, and given continuing economic decline and persisting unemployment differences between the two republics,[24] monetary union would have been costly for Slovakia even in the short run. Therefore, expectations arose that Slovakia would have to resort to monetary policy to counter adverse economic developments. That indeed happened in June 1993 when Slovak currency devaluated by ten percent. Thus, the absence of transfers made the monetary union unstable, increasing the need for exchange-rate adjustments and fueling speculations that eventually brought the common currency down.

2.7 Degree of Openness of the Economy

McKinnon (1963, p.719) argues that "if we move across the spectrum from closed to open economies, flexible exchange rates become both less effective as a control device for external balance and more damaging to internal price level stability." In other words, he argues that the more open is an economy, the more it should be inclined to use fixed exchange rate arrangements. The argumentation is rather simple and rests on the relative importance of the sectors producing exportables and importables. In a small open economy their proportion to non-tradables is relatively high. In flexible exchange rate arrangements prices of exportables and importables vary with the exchange rate, while prices of non-tradeables stay relatively constant. Exchange-rate fluctuations then undermine efforts to maintain stable price level. The picture is different in a large country with sizable production of non-tradables compared to tradables. Exchange-rate movements affect price of exportables and importables but the effect on the general price index will be much lower than in the case of small open economy.[25]

---

[23] In Czechoslovakia, the federal government collected most of tax revenue and in turn redistributed it to the two republics. This makes any estimation of the extent of transfers a very complicated task.

[24] Slovakia's GDP fell by 4 percent during 1993 while the Czech Republic experienced a one-percent decline.

[25] McKinnon (1963) raises also another point, which advocates the use of fixed exchange rates in small open economies – money illusion. He argues that in a highly open economy the money illusion is the lowest. Note that the presence of money illusion is exactly what allows flexible exchange rates

Table 4 reports coefficients of openness for selected countries of Eastern and Western Europe. Clearly, both parts of former Czechoslovakia show high degrees of openness, especially when their mutual trade is also included.[26]

Insert Table 4 here.

2.8 Political Criteria

It seems that political factors played crucial role in determining the break-up of Czechoslovakia. This view is consistent with the work of authors who stressed the pre-eminent role of political factors in creating and sustaining monetary unions. Mintz (1970), for example, stressed as the most important factor for forming currency areas the political willingness of central authorities to pursue monetary union. According to Machlup (1977, p.71), "What ultimately counts, however, is that all members are willing to give up their independence in matters of money, credit and interest. Pragmatically, therefore, an optimum currency area is a region no part of which insists on creating money and having a monetary policy of its own." Finally, Cohen (1993) in a study of six currency unions argued that political considerations dominated the economic criteria in the forming and/or breaking-up of these unions.

The view, that reasons for the break-up of Czechoslovakia were overwhelmingly political while economic factors played a relatively minor role is supported also by Czech and Slovak scholars. Rychlik (1995, p.97) argues that "the reasons for the break-up of Czechoslovakia must be sought in the principles of the development of the modern nation, i.e. in the process of the formation of a separate national awareness of Czechs and Slovaks." In his opinion the economic aspects played a minor role.[27] Similarly Musil (1995, p. 2) argues that "in the history of Czechoslovakia's disintegration, the key role was played by the differences in conceptions and opinions concerning the division of powers between Czech and Slovak political institutions. [….] in spite of extensive efforts by politicians and intellectuals in the interwar period and partly also after the Second World War, the idea of a common Czechoslovak state did not put down deep roots in Slovak soil."

3 Collapse of the Monetary Union between Czech and Slovak Republics

The split of Czechoslovakia occurred as a consequence of parliamentary elections in June 1992. In the Czech Republic, a coalition of three right-of-center parties won, while a left-wing nationalist party won in Slovakia. It became clear soon that the two sides were unable – or unwilling – to form a federal government together. The main points of disagreement were redistribution of power between the federation and the

---

to perform their stabilizing function. Contrary to McKinnon, Giersch (1973) argues that higher exchange rate flexibility is required for small open economies. The reason is that small open economies are more exposed to outside cyclical disturbances and flexible exchange rates help to isolate these economies from the outside shocks.

[26] For 1991, trade between the two countries is estimated using data reported by enterprises, not customs statistics.

[27] Rychlik (1995, p. 104) argues based on his personal discussion that Slovak leaders of the time considered political independence of Slovakia "an absolute value in itself for which no economic prosperity could compensate."

constituent republics, and design of further reforms. Eventually, the Czechs and Slovaks agreed to disagree – by deciding to dismantle the federation and create two independent countries as of January 1, 1993, only half-year after the elections.

To mitigate the economic effects of the split, the Czech Republic and Slovakia retained a common currency, customs union and common labor market. While the customs union and freedom of movement of labor were intended to remain in place indefinitely, the monetary union was conceived as a temporary measure. Nevertheless, the two sides agreed to retain it at least for the first six months of 1993 and then consider further extensions. However, either side could withdraw from the union in case of the following developments:

- fiscal deficit of either republic exceeded 10 percent of budgeted revenues;
- foreign exchange reserves of either republic fell below one month's worth of its imports;
- inter-republic capital transfers exceeded 5 percent of total bank deposits; and
- Monetary Committee (see below) could not reach an agreement on fundamental monetary-policy issues.

The State Bank of Czechoslovakia (SBCS) ceased to exist with the demise of the federation, and instead both republics established their own central banks. For the duration of monetary union, so-called Monetary Committee was charged with determining monetary policy. The governors as well as two senior officials from each central bank were members of the Committee and monetary policy was decided by simple majority vote. The policy was then to be implemented by both central banks in accord with the decisions of the Monetary Committee.

It became clear soon, however, that the ensuing monetary union would not enjoy much credibility. Foreign exchange reserves declined substantially already in November and December 1992 and continued to decline throughout January (see Figure 4). After the two currencies were separated in the second week of February, foreign reserves of the Czech National Bank (CNB) rebounded. The decline continued in Slovakia, however, until the National Bank of Slovakia (NBS) devalued the currency by 10% in July 1993.

Lack of credibility was also evident in the evolution of the parallel exchange rate of the CSK (i.e. exchange rate quoted by foreign commercial banks). According to Prokop (1994, p.46), parallel rate climbed to 51.56 CSK per dollar – 78 percent more than the official exchange rate. Moreover, between January 13 and 28, foreign banks gradually ceased trading in the CSK until well after the currency separation (March 1993).

During late 1992 and throughout January 1993, many Slovak firms and individuals transferred funds to Czech commercial banks in expectation of Slovak devaluation shortly after the split. Further, Czech exports to Slovakia shot up substantially toward the end of 1992 (Figure 5). Czech exports to Slovakia in the last quarter of 1992 rose by 25 percent compared to the last quarter of 1991. On the other hand, while Slovak exports to the Czech Republic also increased, it was only by 16 percent. Moreover, in expectation of future devaluation of the Slovak currency, Slovak importers sought to repay their debts as soon as possible while the Czech importers did exactly the opposite. All these developments led to a gradual outflow of currency from Slovakia to the Czech Republic.[28] The SBCS attempted to balance this outflow by credits to Slovak banks, but this became increasingly difficult in December 1992 and January

[28] See Prokop (1994) and Smidkova (1994)

1993. Thus, Czech government and the CNB decided already on January 19, 1993 to separate the currency. After secret negotiations with the Slovak side, the separation date was set as February 8, 1993, and the Czech-Slovak Monetary Union ceased to exist less than six weeks after it came to being.

The separation was publicly announced on February 2. Starting with February 3, all payments between the two republics stopped and border controls were increased to prevent transfers of cash from one country to the other. During the separation period between February 4-7 (Thursday through Sunday), old Czechoslovak currency was exchanged for the new currencies. The new currencies became valid on February 8. Regular Czechoslovak banknotes were used temporarily in both republics and were distinguished by a paper stamp attached to the face of the banknote. The public was also encouraged to deposit cash on bank accounts prior to the separation since a person could only exchange CSK 4,000 in cash. Business owners were not subjected to this limit. [29]

Coins and small denomination notes (CSK 10, 20 and 50 in the Czech Republic and CSK 10 and 20 in Slovakia) were still used after the separation for several months. Nevertheless, such notes and coins only accounted for some 3 percent of currency in circulation each. On the other hand, the notes of CSK 10, 20 and 50 accounted for some 45 percent of the total number of banknotes. The stamped banknotes were gradually replaced by new Czech and Slovak banknotes. This process was finished by the end of August 1993.

4 Discussion and Concluding Remarks

So is there any moral to this story? Are there any lessons from the break-up of both Czechoslovakia and the monetary union between the Czech and Slovak Republics for stability of other monetary unions – the EMU in particular?

One way to interpret the disintegration of Czechoslovakia is to explain it as the strive of the Slovak people to have their independent nation state. The break-up of Czechoslovakia, then, was more-or-less a historical necessity, and occurred in 1993 as the demise of the communist regime removed political constraints that prevented it from happening before. Czechoslovakia, accordingly, broke up despite remarkable economic, social and demographic convergence, and regardless of economic rationale. The lesson to draw from the split of Czechoslovakia then would be rather bleak for other unions – it would seem that nationalism prevails over economics. The days of countries such as Belgium and Canada may thus be counted, and the EMU might be a futile enterprise.

However, while the political preferences in the Czech Republic and Slovakia clearly diverged in 1992 election, there is evidence that this was in fact motivated by economic differences between the two regions. Fidrmuc (1998a) argues that the different patterns of voters' support for continuation of the economic reform reflected unequal distribution of costs and benefits of the reform. Hence, even though the immediate reason for the break-up of Czechoslovakia was political conflict, it could have been engendered in turn by economic differences between the two regions.

[29] This corresponded to some USD 140. At the time of separation, average monthly income was SK 5,175 in the Czech Republic and CSK 4,659 in Slovakia (according to OECD, 1994). Cash money in excess of the limit could be deposited in an account with the Postbank (the actual exchange was carried out by post offices) or sent as a postal money transfer (to be delivered after the separation period).

Therefore, being economists, we want to pursue a different interpretation from the one above: Even if the break-up of Czechoslovakia was motivated politically – or emotionally – there was little to gain from the break-up of the monetary union. Therefore, given that the monetary union failed, we should be able to find some economic reasons underlying its collapse, and, in turn, also the disintegration of Czechoslovakia.

We use the criteria of the optimum currency area literature to assess whether Czechoslovakia before its break-up was indeed an optimum currency area. We have found that Czechoslovakia was indeed an optimum currency area. The shocks to output were correlated and the two regions were closely integrated through trade flows. However, the extent of integration of the two regions appears lower that in other existing federations. In fact, when looking at correlation of economic shocks, Czechoslovakia appears to have been as integrated as the core EU – but less than the US or Germany. Additional problems were posed by low degree of labor mobility – and in particular by low response of labor to regional shocks – as well as by complete cessation of fiscal transfers after Czechoslovakia broke up but the monetary union continued.

The economic transition that started in 1991 had asymmetric effects in the two regions – its adverse effects were much stronger in Slovakia than in the Czech Republic. Given low labor mobility and, after 1992, absence of fiscal transfers, the two regions had few options for dealing with asymmetric shocks other than resorting to exchange-rate adjustments – thus in effect abandoning the common currency.

Moreover, the Czech-Slovak Monetary Union failed also because its design was fundamentally flawed. Besides lack of political commitment and absence of fiscal transfers to mitigate asymmetric shocks, the union's sustainability was undermined also by its low credibility and low exit costs. Lack of political commitment and low credibility – and speculative transactions it induced – were the immediate reasons for the collapse. The monetary union did not have a single monetary authority, instead, monetary policy was decided and coordinated by the *Monetary Committee* which was composed of representatives of the two national central banks. Clearly, the national representatives were charged with pursuing the interests of their own country, not the union. Implementation of policy decisions was also the task of the national banks.

At the same time, exit costs – the costs of abandoning the common currency – was rather small. Mutual trade (measured by enterprise data, see note to Figure 5) fell by some 25% in 1993. However, trade rebounded somewhat later (Figure 3), and lost trade was to a great extent only diverted elsewhere – in particular the EU. Similarly, while the break-up of Czechoslovakia certainly contributed to economic decline in 1993 – GDP declined by one percent in the Czech Republic and four percent in Slovakia – both countries grew in 1994. The decision to maintain monetary and customs unions and common labor market after the split of Czechoslovakia made the demise of federation little costly. Similarly, the fact that the common currency could be abandoned while preserving the customs union and common labor market guaranteed little effort on both sides to try hard to preserve the monetary union.[30]

[30] For example, there were some 59 thousand Slovak citizens employed in the Czech Republic in 1995 and 72 thousand in 1996. This corresponded to 2.3 and 2.8 percent respectively, of Slovak labor force. This certainly helped to alleviate Slovak unemployment problem, with unemployment rate standing at 13.1 and 12.8 percent, respectively.

Thus, the temptation to leave the union is higher if expected exit costs – decline of trade with the rest of the union members – are small. The ease with which the Czech Republic and Slovakia introduced national currencies just weeks after the former federation had been replaced by monetary and customs unions illustrates this point. In the case of Czechoslovakia, the incremental costs of abandoning common currency were relatively small and failed thus to serve as a deterrent to further disintegration. Absence of fiscal transfers to regions hit by asymmetric and/or deeper shocks further provided additional incentive to quit the union and introduce national currency.

Finally, the case of Czechoslovakia shows that while formation of a monetary union is a tedious job of many years, its dissolution can occur quickly and does not need to be very costly. Thus, Barro's concern[31] that the costs of dissolving the future monetary union in Europe will be high, does not seem to us to necessarily valid for the break-up of Czechoslovakia. In fact, the costs of the break-up of Czechoslovakia and dissolution of the monetary union were relatively low, even in the short-run. It seems that in the world of free trade, small countries and regions benefit since the importance of political boundaries declines.

5 References

Alesina, Alberto, Roberto Perotti and Enrico Spolaore (1995), "Together or Separately? Issues on the Costs and Benefits of Political and Fiscal Unions," European Economic Review 39, 751-758.

Alesina, Alberto and Roberto Perotti (1995), "Economic Risk and Political Risk in Fiscal Unions," NBER Working Paper 4992.

Alesina, Alberto and Enrico Spolaore (1997), "On the Number and Size of Nations," *Quarterly Journal of Economics*, November 1997, 1027-56.

Alesina, Alberto, Enrico Spolaore and Romain Wacziarg (1997), "Economic Integration and Political Disintegration," NBER Working Paper 6163.

Andrews, Donald W.K. (1993), "Tests for Parameter Instability and Structural Change with Unknown Change Point," *Econometrica* **61** (4), 821-856.

Batt, Judy (1993), "Czecho-Slovakia in Transition: From Federation to Separation," The Royal Institute of International Affairs Discussion Paper 46, London, UK.

Bayoumi, Tamim and Barry Eichengreen (1993), "Shocking Aspects of European Monetary Integration," in: Torres, Francisco and Francesco Giavazzi eds., "Adjustment and Growth in the European Monetary Union," Cambridge University Press and CEPR, Cambridge, UK.

Bernard, Andrew B. and Steven N. Durlauf (1991), "Convergence of International Output Movements," NBER Working Paper #3717.

Bolton, Patric and Gérard Roland (1995), "The Break up of Nations: A Political Economy Analysis," *Quarterly Journal of Economics*, November 1997, 1057-90.

Capek, Ales and Gerald W. Sazama (1993), "Czech and Slovak Economic Relations," *Europe-Asia Studies* **45** (2), 211-235.

Canzoneri, M.B. and C.A. Rogers (1990), "Is the European Community an Optimal Currency Area?," *American Economic Review* **80** (3), 419-433.

Chow, Gregory C. (1960), "Tests of Equality between Sets of Coefficients in Two Linear Regressions," Econometrica {28} (3), 591-605.

[31] Barro (1992, WSJ, August 13) quoted in Tavlas (1993).

CNB (1993), “Report on Monetary Developments in the Czech Republic in the First Half of 1993,” Czech National Bank, Prague.

Cohen, B. (1993), “Beyond EMU: The Problem of Sustainability,” Economics and Politics 5 (2), 187-203.

Cukierman A. (1995), “How Can the European Central Bank Become Credible?,” mimeo., paper prepared for a CEPR conference on “What Monetary Policy for the European Central Bank,” Frankfurt, Germany, June 1995.

Cukierman A. (1996), “The Credibility Problem, EMU and Swedish Monetary Policy,” Backround paper for the Swedish Government Commission on EMU, mimeo.

Dedek, Oldrich, et al., (1996), “The Break-up of Czechoslovakia: An In-depth Economic Analysis,” Aldershot, Avebury, UK.

De Grauwe, Paul (1994), “The Economics of Monetary Integration,” Oxford University Press, second edition, Oxford, New York.

Eichengreen Barry and Jürgen Von Hagen (1996), “Fiscal Policy and Monetary Union: Federalism, Fisal Restrictions and the No-Bailout Rule,” in Horst Siebert ed., “Monetary Policy in an Integrated World Economy,” Tübingen, 211-231.

Fidrmuc, Jan (1998a), “Political Support for Reforms: Economics of Voting in Transition Countries,” Tilburg University, mimeo, [available at URL: http://center.kub.nl/phd_stud/fidrmuc/papers.HTM].

Fidrmuc, Jan (1998b), “Stochastic Economic Shocks and Incentives for (Dis)Integration, Tilburg University, mimeo, [available at URL: http://center.kub.nl/phd_stud/fidrmuc/papers.HTM].

Fidrmuc, Jan and Jarko Fidrmuc (1997), “Impediments to Exports in Slovakia,” in Cooper, Richard and Janos Gacs eds. (1997), op. cit.

Fidrmuc, Jarko et al. (1994), “The Slovak Republic: After One Year of Independence,” Bank Austria, Vienna.

Frankel, J.A. and A.K. Rose (1996), “Economic Structure and the Decision to Adopt a Common Currency,” Backround paper for the Swedish Government Commission on EMU, mimeo.

Funke, Michael (1997), “The Nature of Shocks in Europe and Germany,” *Economica* **64**, 461-69.

Cooper, Richard and Janos Gacs eds. (1997), “Trade Growth in Transition Economies,” Edward Elgar.

Goodhart, Charles, A. E., “The Political Economy of Monetary Union,” in Kenen ed. 1995, 448-505.

Hajek M. et al. (1993), “Ceskoslovenska ekonomika v zaveru roku 1992,” Czech National Bank Research Paper No. 3.

Halm, George, ed. (1970), “Approaches to Greater Flexibility of Exchange Rates,” The Burgenstock Papers, Princeton University Press,.

Johnson, Harry G., “The Case for Flexible Exchange Rates, 1969,” in Halm (1970), 91-111, Reprinted in Johnson (1973).

Johnson, Harry G. (1973), “Further Essays in Monetary Economics,” Harvard University Press.

Johston J. (1984), “Econometric Methods,” McGraw Hill, New York.

Kenen, Peter B. (1969), “The Theory of Optimum Currency Areas: An Eclectic View,” in Mundell and Swoboda, eds., “Monetary Problems of the International Economy,” Chicago, University of Chicago Press.

Kenen, Peter B. (1995), “Understanding Interdependence. The Macroeconomics of the Open Economy”, Princeton University Press, Princeton, New Jersey.

Kenen, Peter B. (1997), “Preferences, Domains, and Sustainability,” American Economic Review, May, Papers and Proceedings 211-213.

Kiss, Yudit (1993), “Lost Illusions? Defense Industry Conversion in Czechoslovakia, 1989-92,” *Europe-Asia Studies* **45** (6), 1045-69.

Machlup, Fritz (1977), “A History of Thought on Economic Integration,” Columbia University Press.

Masson P.R. and M.P. Taylor (1992), “Common Currency Areas and Currency Unions: An Analysis of the Issues,” CEPR Discussion Paper No. 617.

McCallum, John (1995), “National Borders Matter: Canada-U.S. Regional Trade Patterns,” *American Economic Review* **85** (3), June 1995, 615-623.

McKinnon R.I. (1963), “Optimum Currency Areas,” *American Economic Review* **53**, 717-725.

Melitz, Jacques (1995), “The Current Impasse in Research on Optimum Currency Areas,” *European Economic Review* **30**, 492-500.

Melitz J. (1996), “The Evidence about the Costs and Benefits of EMU,” Backround paper for the Swedish Government Commission on EMU, mimeo.

Minford, Patrick (1993), “Discussion of Bayoumi and Eichengreen,” in: Torres, Francisco and Francesco Giavazzi eds., “Adjustment and Growth in the European Monetary Union,” Cambridge University Press and CEPR, Cambridge, UK.

Mintz, Norman N. (1970), “Monetary Union and Economic Integration”, The Bulletin, New York University Graduate School of Business Administration, Institute of Finance, No.64, April 1970.

Mundell R.A. (1961), “A Theory of Optimum Currency Areas," *American Economic Review* **51**,657-665.

Musil Jiri ed. (1995), “The End of Czechoslovakia,” Central European University Press, Budapest.

Musil Jiri (1995), “Czech and Slovak Society,” in Musil ed. (1995) *op. cit.*, 76-94.

Niehans, Jürgen (1984), “International Monetary Economics,” The John Hopkins University Press.

NBS (1994), “Annual Report 1993,” The National Bank of Slovakia, Bratislava.

OECD (1994), “Economic Survey of the Czech and Slovak Republics,” Paris.

Pavlinek, Petr (1995), “Regional Development and the Disintegration o f Czechoslovakia,” *Geoforum* **26** (4), 351-372.

Prokop L. (1994), “Priprava a prubeh menove odluky v Ceske republice v r. 1993,” Czech National Bank Research Paper No. 28.

Rychlik, Jan (1995), “National Consciousnes and the Common State (A Historical-Ehnological Analysis,” in Musil ed. (1995) *op. cit.*, 97-105.

Smidkova K. (1994), “Exchange-Rate System between the Czech and Slovak Republics,” Czech National Bank Research Paper No. 16.

Stock, James H. and Mark W. Watson (1996), “Evidence on Structural Instability in Macroeconomic Time Series,” *Journal of Business and Economic Statistics* **14** (1), 11-30.

Stranger, Allison K. (1996), “Czechoslovakia’s Dissolution as an Unintended Consequence of the Velvet Constitutional Revolution,” East European Constitutional Review, Fall 1996, 40-46.

Uhlig, H. (1996), “Long Tern Debt and the Political Support for a Monetary Union,” mimeo., Tilburg University.

Tavlas, George S. (1993), "The 'New' Theory of Optimum Currency Areas", *The World Economy* **16**, 663-685.

Von Hagen, Jürgen, and Barry Eichengreen (1996), "Federalism, Fiscal Restraint, and European Monetary Union," *American Economic Review*, Papers and Proceedings, May 1996, 134-138.

Von Hagen, Jürgen and Barry Eichengreen (1996), "Federalism, Fiscal Restraints, and European Monetary Union," *American Economic Review* **86** (2), 135-138.

Von Hagen, Jürgen and George W. Hammond (1996), "Regional Insurance against Asymmetric Shocks: An Empirical Study for the European Community," mimeo.

Von Hagen, Jürgen and Manfred Neumann (1996), "A Framework for Monetary Policy under EMU," in Deutsche Bundesbank, "Monetary Policy Strategies in Europe," Vahlen 1996, 141-165.

Von Hagen, Jürgen and Ralph Süppel (1994), "Central Bank Constitutions for Federal Monetary Unions," *European Economic Review* **38**, 774-782.

Wolchik, Sharon L. (1995), "The Poliitcs of Transition and the Break-Up of Czechoslovakia," in Musil ed. (1995) *op. cit.*, 225-244.

Appendix: Structural Vector Autoregressive Model

Consider two types of orthogonal shocks that are the sources of variation in domestic output, y_t, and the price level, p_t: a supply shock, ε_{1t}, and a demand shock, ε_{2t}. Following Bayoumi and Eichengreen (1992) we identify them as real supply shocks (having a permanent effect on real output) and nominal demand shocks (having only a temporary effect on real output). Assuming the variables are unit root processes and are in logarithms, the vector $\Delta X_t = [\Delta y_t \ \Delta p_t]$ is stationary and can be written as an infinite moving average process:

$$\Delta xt = \sum_{i=0}^{\infty} Aiet - i = A(L)et \qquad \text{(A1)}$$

or in matrix form

$$\begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix} = \begin{bmatrix} a_{11}(L) & a_{12}(L) \\ a_{21}(L) & a_{22}(L) \end{bmatrix} \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix}$$

where $a_{ij}(L)$ are polynomials and A_i are matrices in the lag operator L. The time paths of the effects of various shocks on the growth rate of output and prices are given by the coefficients of the polynomials $a_{ij}(L)$. Furthermore, coefficient $a_{ij}(k)$ in the $a_{ij}(L)$ polynomial is the response of variable i to a unit shock in ε_{it} after k periods. We also adopt the notation such that $a_{ij}(1)$ is the sum of all the moving average coefficients and gives the cumulative effect of ε_{jt} on variable i over time. The shocks have the following properties: the variance is normalized to equal unity, $E(e_t e'_t) = I, E(e_t e_{t+j}) = 0, \forall j \neq 0$.

In order to identify this model, one can estimate a finite order bivariate VAR

$$\Delta x_t = B_1 \Delta x_{t-1} + B_2 \Delta x_{t-2} \ldots + B_k \Delta x_{t-k} + e_t \qquad \text{(A2)}$$

where the maximum lag length k is chosen such that residuals, e_{it}, approximate white noise and

$$E(e_t e'_t) = \Sigma \qquad \text{(A3)}$$

Since the elements of ΔX_t are stationary, the system can be inverted to obtain the moving average representation:

$$\Delta x_t = e_t + C_1 e_{t-1} + C_2 e_{t-2} + \ldots = \sum_{i=0}^{\infty} C_i e_{t-i} = C(L) e_t \qquad \text{(A4)}$$

The contemporaneous relationship between the orthogonal (pure) innovations ε_t and the composite innovations e_t is

$$e_t = A_0 e \qquad \text{(A5)}$$

Thus the following relationship exists between the variance-covariance matrices:

$$E(e_t e'_t) = A_0 (e_t e'_t) A'_0 \qquad \text{(A6)}$$

and

$$\Sigma = A_0 A'_0 \qquad \text{(A7)}$$

Since Σ is a symmetric matrix with known elements (or can be estimated consistently), it imposes one restriction on the matrix of contemporaneous effects, A_0, which has four elements. Three additional restrictions are needed to identify A_0, so that the orthogonal shocks ε_{it} can be recovered using equation (5). The traditional method is to pick A_0 as the Choleski factorization of Σ, which has been criticized on the grounds that it imposes an arbitrary structure on the orthogonal ε_{it} sequences. Blanchard and Quah (1989) utilize another way of circumventing the problem of

arbitrary identification. This can be seen from the relationship between the matrices of long term effects. If we evaluate the polynomials embedded in equations (1) and (4) at L = 1, and note the relationship in equation (5):

$$A(1) = C(1)A_0 \qquad \text{(A8)}$$

where C(1) contains known elements. In order to identify the shocks, we impose the following restriction on the long run matrix A(1): the aggregate supply curve is vertical in the long run. This corresponds to the restriction that $a_{12} = 0$ in equation (1). After A_0 is identified, one can recover the orthogonal shocks using equation (5).

Using the above method, we estimated the correlation of supply and demand shocks between the Czech Republic and Slovakia during 1948-90. Complete results are presented in Table A1.

Table A1 Correlation of Supply and Demand shocks: Czech Republic and Slovakia

Data Used	Supply shocks	Demand shocks
Net Material Product, 1948-1990	0.52	0.32
Net Material Product, 1960-1990	0.48	0.37
Net Material Product, 1970-1990	0.43	0.81
Disposable Net Material Product, 1948-1990	0.34	0.42
Disposable Net Material Product, 1960-1990	0.53	0.51
Disposable Net Material Product, 1970-1990	0.46	0.83

Data Source: Historical Statistical Yearbook of Czechoslovakia (1985) and Statistical Yearbook (various volumes), Federal Statistical Office, Prague.

Table 1 Correlation Coefficients, Supply and Demand shocks.

	Supply shocks	Demand shocks
Czech Republic and Slovakia (NNP)[1]	0.48	0.37
Czech Republic and Slovakia (DNNP)[1]	0.53	0.51
Netherlands and Belgium[2]	0.48	0.51
Germany and France[2]	0.54	0.35
Germany and Netherlands[2]	0.51	0.47
Germany and United Kingdom[2]	0.11	0.16
North Rhine-Westphalia and Hessen[3]	0.80	0.82
North Rhine-Westphalia and Bavaria[3]	0.69	0.64
Bavaria and Baden-Wurttenberg[3]	0.76	0.82
Hamburg and Bremen[3]	0.14	-0.21
Mid-East and New England[2]	0.86	0.79
Mid-East and Rocky Mountains[2]	0.18	-0.28

Sources and data description: [1] authors, net material product (NMP) and disposable NMP, 1960-1990; [2] Bayoumi and Eichengreen (1993), GDP, 1960-1988; [3] Funke (1997), GDP, 1970-1993. See Appendix A for further results.

Table 2 Commodity Structure of Czech and Slovak Foreign Trade, 1993

	Czech Republic		**Slovakia**		**Mutual Trade**	
Category	Exports	Imports	Exports	Imports	CZ->SK	SK->CZ
SITC0 Food & animals	6.5%	6.3%	5.5%	7.3%	7.6%	5.5%
SITC1 Beverages & Tabacco	1.2%	1.1%	0.9%	1.5%	2.5%	1.4%
SITC2 Crude Materials excl. Fuels	6.1%	5.0%	4.9%	5.2%	2.2%	4.3%
SITC3 Mineral Fuels & Related	6.2%	11.1%	4.9%	20.9%	10.2%	6.6%
SITC4 Animal & Vegetable Oils	0.2%	0.4%	0.1%	0.2%	0.4%	0.2%
SITC5 Chemicals	9.5%	12.1%	12.0%	11.4%	12.3%	14.4%
SITC6 Mfgd. Goods	29.9%	15.9%	38.8%	15.1%	25.1%	34.0%
SITC7 Machinery & Transport Equip.	27.6%	36.1%	19.4%	29.3%	27.3%	23.8%
SITC8 Misc. Mfgd. Articles	12.7%	11.7%	13.4%	9.0%	12.3%	9.8%
SITC9 Others	0.0%	0.4%	0.1%	0.2%	0.1%	0.0%

Sources: Czech Statistical Office and Statistical Office of Slovak Republic
CZ->SK refers to Czech Exports to Slovakia; SK->CZ indicates Slovak exports to the Czech Republic.

Table 3 Labor Mobility: Determinants of Net Migration

Country	**Czech Republic**		**Slovakia**		**Pooled Data Set**			
Year	1992	1994	1992	1994	1992	1992	1994	1994
Intercept	***0.161***	***0.164***	-0.031	***0.187***	***0.104***	***0.161***	***0.108***	***0.165***
	(3.51)	***(4.31)***	(-0.34)	***(2.92)***	***(4.12)***	***(3.58)***	***(5.43)***	***(4.57)***
Unempl. Rate	**-0.032**	**-0.023**	-0.003	**-0.006**	***-0.014***	**-0.032**	-0.003	**-0.023**
	(2.24)	**(2.23)**	(0.40)	**(1.97)**	***(4.12)***	**(2.28)**	(1.82)	**(2.37)**
Dummy for						-0.191		0.022
Slovakia						(1.83)		(0.27)
Interaction						0.029		0.016
Variable						(1.82)		(1.53)
R^2	0.06	0.06	0.004	0.10	0.13	0.16	0.03	0.08
Intercept	0.638	-0.053	**-1.309**	-0.273	0.139	0.202	0.132	-0.21
	(1.82)	(0.15)	**(2.16)**	(0.70)	(0.45)	(0.65)	(0.55)	(0.75)
Unempl. Rate	-0.021	**-0.022**	-0.003	**-0.009**	***-0.019***	-0.025	-0.005	**-0.019**
	(1.48)	**(2.03)**	(0.34)	**(2.17)**	***(3.91)***	(1.79)	(1.47)	**(1.98)**
Avg.Wage	-0.045	0.026	0.244	0.081	0.018	0.014	0.007	0.046
	(0.70)	(0.69)	(2.17)	(1.63)	(0.32)	(0.24)	(0.28)	(1.56)
Industrial	-0.004	0.000	0.004	-0.002	-0.001	-0.002	-0.001	-0.000
Emplmnt	(1.46)	(0.14)	(1.07)	(0.78)	(0.65)	(0.74)	(0.99)	(0.18)
Agricultural	**-0.011**	0.000	0.009	0.007	-0.004	-0.005	0.000	0.003
Emplmnt	**(2.75)**	(0.06)	(1.73)	(1.70)	(1.32)	(1.51)	(0.03)	(0.93)
Hungarian			0.002	0.001	***0.004***	**0.003**	0.002	0.002
Minority			(1.40)	(0.62)	***(2.65)***	**(2.27)**	(1.60)	(1.32)
Dummy for						-0.167		0.122
Slovakia						(1.54)		(1.28)
Interaction						0.018		0.010
Variable						(1.12)		(0.95)
R^2	0.16	0.07	0.27	0.37	0.21	0.22	0.08	0.14

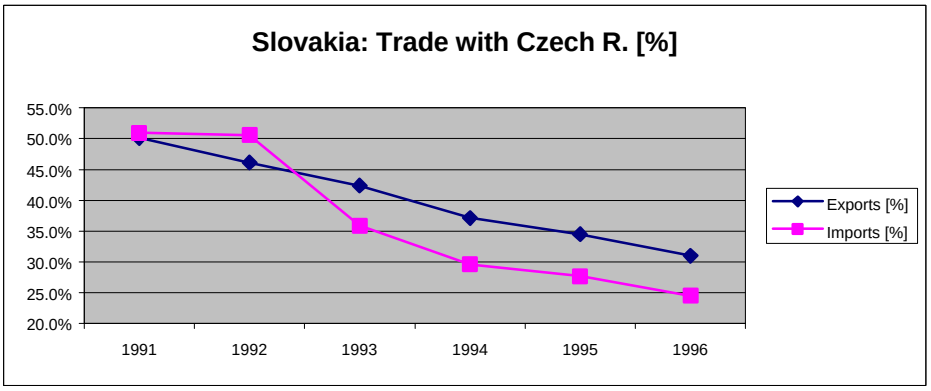
Data sources: Czech and Slovak Statistical Offices. Data are per 76 Czech and 38 Slovak counties.
Notes: Dependent variable is net migration inflow as a percentage of the county's population. Unemployment rate is the end-of-year value, wages are yearly averages. Industrial and agricultural employment are expressed as a percentage of total employment, hungarian minority as a percentage of county's population (applies to Slovakia only). Interaction Variable is the product of unemployment rate and a dummy equal to one if the region is in Slovakia. T-statistics are reported in parentheses.
Significance: bold 5 %, bold and italic 1%.

Table 4 Openness of selected Eastern and Western European Countries

Eastern Europe	**Openness**	**Western Europe**	**Openness**
Czechoslovakia	67.84	Austria	74.67
Czech Republic [1]	86.82	Belgium	141.90
Czech Republic [2]	59.01	France	42.59
Slovakia [1]	128.51	Germany	53.91
Slovakia [2]	63.55	Italy	38.29
Hungary [3]	71.90	Netherlands	105.15
Slovenia [3]	69.00	United Kingdom	50.10

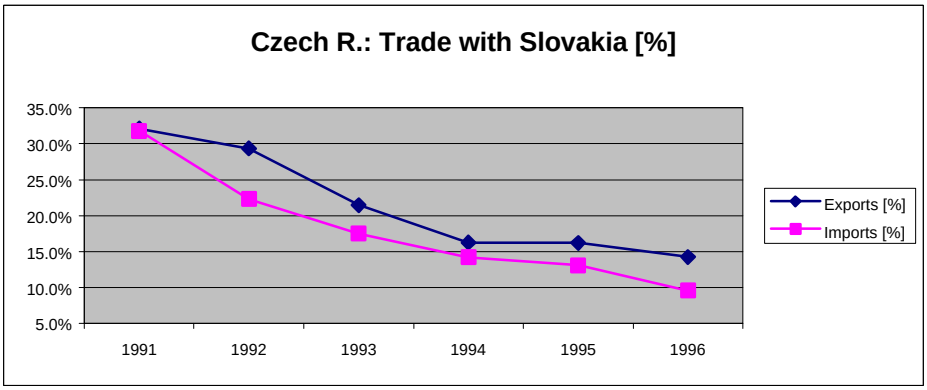
Unless otherwise indicated based on Heston-Summers (1992) data set using 1988 data. Variable Openness is calculated as (Exports + Imports) / Nominal GDP.
[1] 1991 data, including trade between the Czech Republic and Slovakia.
[2] 1991 data, excluding trade between the Czech Republic and Slovakia.
[3] 1991 data, based on figures reported in Cooper and Gacs eds. (1997).

Figure 1



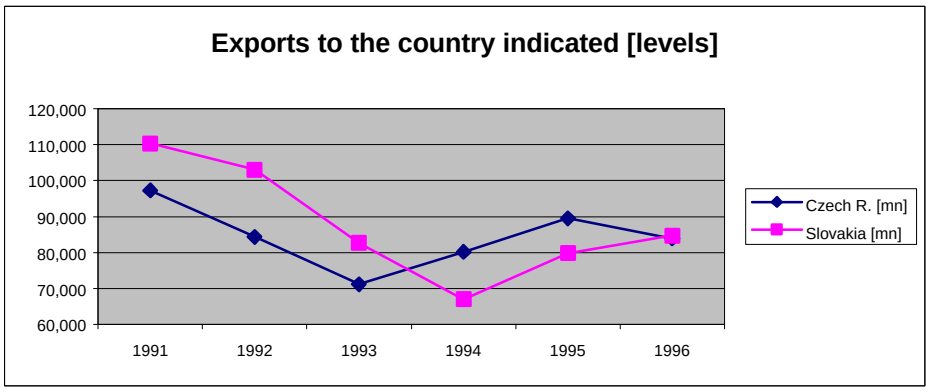
Sources: Slovak Statistical Office.
Note: 1991-92 figures based on enterprise data.

Figure 2



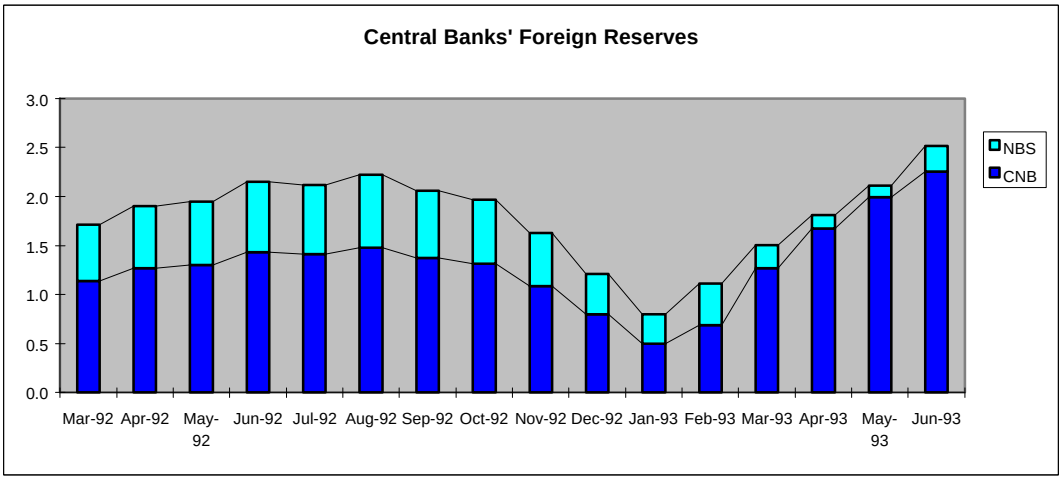
Sources: Czech Statistical Office and Slovak Statistical Office.
Note: 1991-92 figures based on enterprise data.

Figure 3



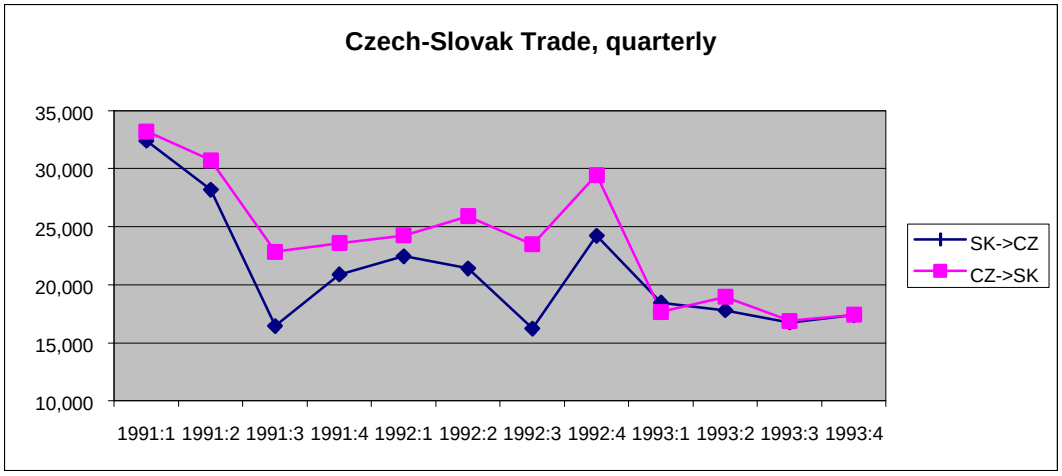
Sources: Czech Statistical Office and Slovak Statistical Office.
Note: the levels of trade are not directly comparable
as they are expressed in national currencies

Figure 4



Note: For 1992, we divided Czechoslovakia's reserves two-thirds to the Czech Republic and one-third to Slovakia.
NBS is National Bank of Slovakia, CNB is Czech National Bank
Sources: CNB and NBS Annual Reports.

Figure 5



Note: Both series are trade figures reported by enterprises.
Source: Slovak Statistical Office
CZ->SK refers to Czech Exports to Slovakia;
SK->CZ indicates Slovak exports to the Czech Republic.